ailment. Generally, antibiotics fight bacteria, whereas antifungal medications treat fungi, antiviral medications fight viruses, and pediculicides and scabicides fight parasites.

Bacteria

Several bacterial infections can wreak havoc on the skin, the most common example being acne. **Acne** is an inflammatory disorder that affects the sebaceous glands. Acne occurs most commonly in adolescents due to an increase in androgens (male hormones present in both men and women). Bacteria can also cause acne, which affects adolescents and adults. Hormonal changes that occur during puberty cause **seborrhea,** a condition caused by an overproduction of skin oils. Abnormal **keratinization,** or hardening of the epithelial tissue, also occurs. A bacterium, *Propionibacterium acnes,* grows inside the sebaceous glands and makes an irritating, acidic substance. The skin produces inflamed bumps, called pustules, in response to this irritation.

Open **comedones,** or blackheads, are oil glands plugged with melanin granules. Closed comedones, or whiteheads, are white rather than black because they are produced just below the skin and lack melanin. Deeper lumps called **nodules** involve inflammation deep below the skin. Severe inflammation and pus can cause pain, deformity, and eventual scarring.

Rosacea is a type of skin irritation without pus. Small bumps, or papules, redden the skin. Even though these papules do not contain pus, they may produce pain because of the thickening and swelling. The patient with rosacea appears flushed, especially on the nose and cheek. Sunlight, stress, and hot temperatures can aggravate rosacea, as can alcohol, spicy foods, and hot beverages.

Medications used to treat acne and rosacea can be applied topically to the irritated areas, frequently the face, back, and neck. The active ingredient in these medications may be vitamin A, an acid, or an antibiotic. Over-the-counter (OTC) medications, such as a cream, gel, or lotion, usually contain benzoyl peroxide. Benzoyl peroxide is bacteriostatic (inhibits bacterial growth).

Retinoids contain vitamin A, which increases the body's resistance to infection by reducing the oil production that clogs the pores. Retinoids reduce both the function of the sebaceous glands and keratinization. Because of serious associated side effects (birth defects, emotional problems), oral retinoids are reserved for patients with severe acne who do not respond to other topical agents. For severe acne, salicylic acid, sulfur, or resorcinol may be used topically to remove the infected skin through shedding. Systemic antibiotics such as tetracyclines are sometimes necessary in extreme cases.

Oral contraceptives have also been effective in decreasing the symptoms of acne and are sometimes prescribed for this purpose. The hormones in some oral contraceptives can help stop acne from forming by reducing androgen production.

Another bacterial infection is **impetigo,** which most commonly occurs in children. A common example is a child with an upper respiratory infection who is constantly wiping his or her nose until the skin breaks down and allows entry of bacteria. This condition is treated with topical antibiotics, topical corticosteroids, and, if the infection is severe, systemic antibiotics.

CRITICAL THINKING

Think of ways to inhibit the growth of skin infections. (What conditions enhance growth of microorganisms?) List at least two ways (not including medications) that will slow down or stop the growth of these microorganisms.

Fast Tip 11.1 Applying Skin Medications

When applying skin medications, teach the patient to wash the affected area with a clean damp cloth to remove any old medication and/or microorganisms, and apply medication in a very thin layer to the clean skin. Make sure the patient understands the importance of only using a clean cloth each time to prevent recontamination of the skin with the dirty cloth.